

Solarization

As previously discussed, solarization is a change in material characteristics due to illumination of a material with ultraviolet ("solar") light. High intensities of UV illumination can cause photo-thermal damage in quartz optical fibers, dramatically increasing the scattering and attenuation.

Long life, deep UV transmission is possible with Polymicro's solarization resistant optical fibers. This breakthrough in fiber technology allows optical fibers to be used with deuterium lamps and a wide variety of deep UV laser sources. This fiber overcomes the age-old problem of induced color centers around 210-214nm. It is ideal for deep UV spectroscopy, lithography, and excimer laser delivery systems. Fiber sizes can be produced from 50 μ m to greater than 1000 μ m. Custom cabled or multifiber assemblies are available. The understanding and development of solarization resistant and non-solarizing fibers continues. Not long ago, Polymicro only had one SR (Solarization Resistant) alternative to the standard high -OH fiber. This fiber was hydrogen loaded and provided excellent transmission, but had limitations for small fibers and elevated temperatures. This fiber was later labeled in articles as the UVI fiber. The option of an aluminum buffer, labeled in articles as UVI², was then added as a method to provide longevity with small fibers and elevated temperatures.

Recently, with the availability of a modified core preform, a new fiber became available designated as UVM. This fiber provides long term stability, but at a cost of some transmission. By combining hydrogen loading and the modified core material designated as UVM, advantages are seen that provide the excellent performance of hydrogen loading and, if over time the hydrogen loading is lost by diffusion, the fiber will revert to the characteristic UVM performance. To simplify the product line, Polymicro is currently offering, in addition to our standard fibers

- 1) UVM – Modified core.
- 2) UVMH – Modified core that is hydrogen loaded.

A graphical representation of these fibers is shown in Figure 2-21. There is also a table provided to give a guideline for suggested use of each type of fiber. Since actual application requirements may vary, this table only serves as a guideline. Testing and improvements are ongoing to create the very best and proven solution.

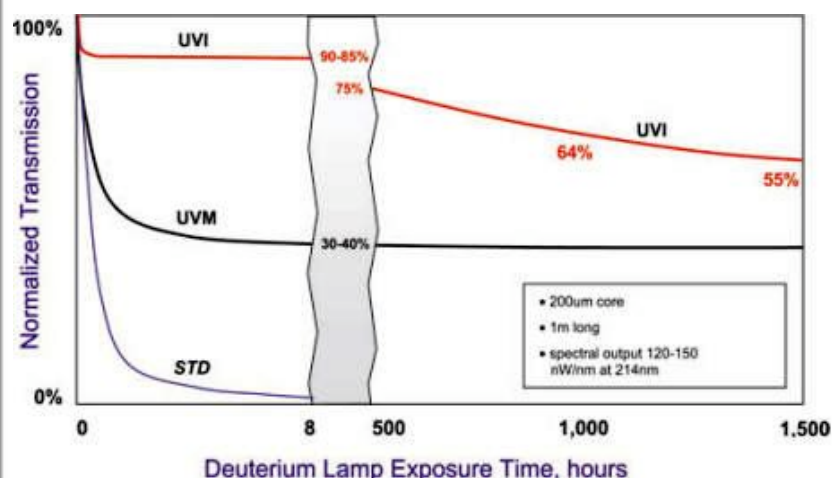


Figure 2-21 Effect from Deuterium Lamp on Transmission of Various Optical Fibers

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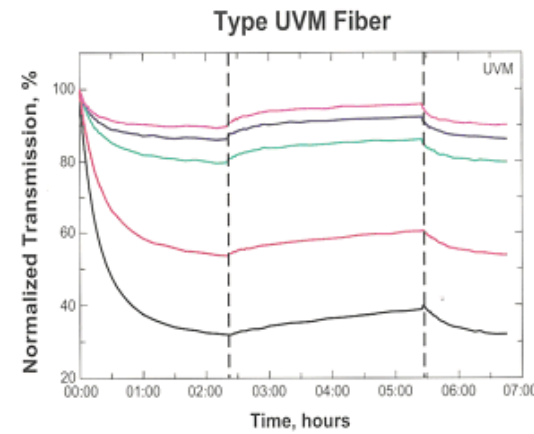
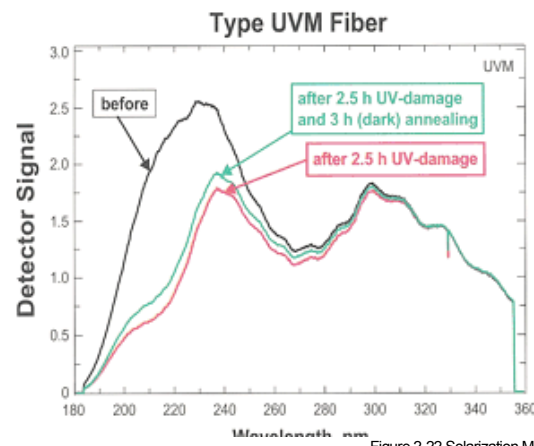
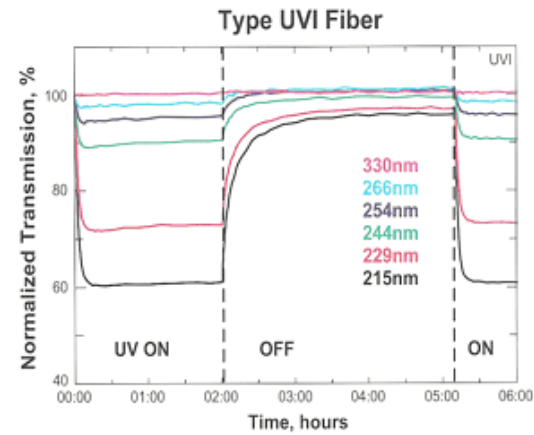
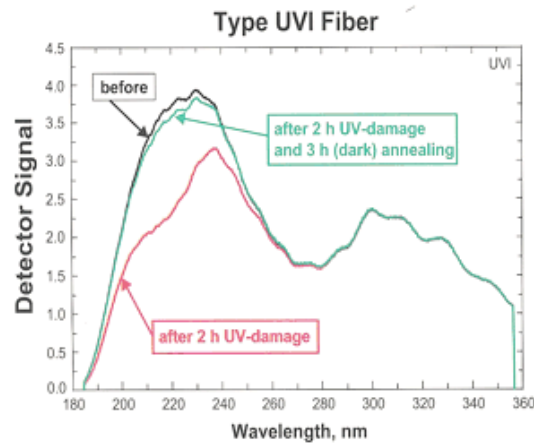
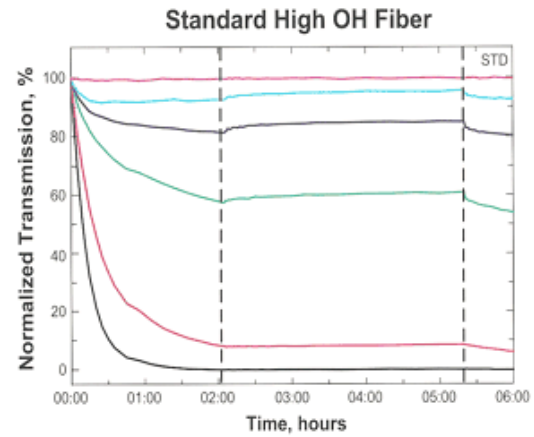
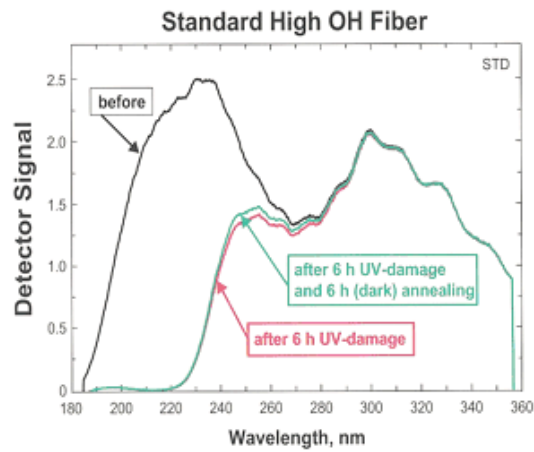


Figure 2-22 Solarization Measurements on Three Materials

Recommendation for UV Solarizing Resistant and Non-Solarizing Fibers

Type	Recommendation
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UVM

- All coatings and diameters possible. Reduced influence of diameter
- Lowest cost
- Applications: Short length, <1 meter

UVMI

- All coatings possible
- Diameter and temperature dependent degradation with time
- Applications: Long length, >1 meter to 5-10 meters; Core diameter >400µm

[< PREVIOUS](#) | [INDEX](#) | [NEXT >](#)

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